MEETINGS

Monitoring the Arctic Ocean North of the Pacific Ocean

Pacific Arctic Group Meeting, Shanghai, China, 11–12 October 2006

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As global temperatures rise, the Arctic will undergo significant environmental changes. Though the Atlantic side of the Arctic is heavily studied, regions north of the Pacific Ocean remain poorly studied by comparison. To overcome this, in 2001 the International Arctic Science Committee established the Pacific Arctic Group (PAG), a program that fosters collaborative study of the area extending from the Bering Sea northward into the Arctic Ocean, including the Chukchi and Beaufort seas and the Makharov and Canada basins. A group of six core nations including China, South Korea, Japan, the Russian Federation, Canada, and the United States make up the coordinating body of the PAG.

To advance logistical and scientific coordination during the International Polar Year of 2007 and 2008, scientists dedicated to collectively investigating the Pacific side of the Arctic Ocean met last year in Shanghai, China. The meeting attendees agreed that the following research themes will help focus future efforts:

1. Undertake seasonal and interannual observations in the Pacific Arctic where recent maximum sea ice retreat is occurring. Observations are needed over various time and space scales to understand the impact of seasonal sea ice retreat on the physical and ecosystem dynamics in the Pacific Arctic.

2. Understand oceanic and atmospheric processes in the Pacific Arctic, including the teleconnections that are critical to midlatitude climate. Examples of connectivity include ocean oscillations, and possible links between the Indian Ocean monsoons.

3. Monitor fresh water via precipitation, riverine input, oceanic input, and glacial and sea ice melt in the Pacific Arctic. The freshwater budget of the Pacific Arctic sector plays a critical role in the formation and maintenance of sea ice, and the overall global thermohaline circulation.

4. Identify and monitor ecosystem and biological indicators and chemical tracers of climate change in the Pacific Arctic to understand how the physical forcing and variability in the Pacific region influence trophic structure, species composition, biodiversity, and ecosystem structure.

5. Investigate sea ice thermodynamics including sea ice thickness and extent and its interactions with ocean and atmospheric forcing in the Pacific Arctic region.

6. Understand the connectivity of warm Atlantic inflow to the Pacific sector, heat flux throughout the Arctic, and associated biodiversity/invasion of Atlantic species into the region. Boundary currents along the continental margin of the Makharov Basin need to be monitored to track Atlantic water intrusion into the Pacific Arctic.

7. Map the unexplored Arctic Ocean. Significant information gaps include bathymetry, biodiversity, and knowledge of ocean current variability over space and time. Information is needed to enable the construction of base maps necessary for the planning of future monitoring efforts.

8. Trace the influx of the Pacific water inflow through the Bering Strait because it is a key conduit for heat, salt, nutrients, and biological material (including genetic material) to the Arctic Ocean.

9. Examine the nearshore coastal processes and subsea permafrost dynamics because the Pacific Arctic shelf areas are subject to large climate changes that can and will affect local human resource use, marine mammal migration pathways, and coastal erosion.

10. Understand the paleorecord of the Pacific Gateway to gain further insight into present-day climatic processes. The opening and closing of the Pacific Gateway to the Arctic has occurred over geological time periods with dramatic impact on the Arctic system.

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Antarctic Sedimentary Basins: Key to Understanding Glacial Processes

Workshop to Establish an Integrated Seismic Stratigraphy for the Ross Sea, Antarctica, Trieste, Italy, 18–20 June 2007

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The Cenozoic history of the Antarctic is recorded largely in the sedimentary basins of the Antarctic continental shelf. The seismic data across these basins are particularly important in defining the development of the cryosphere over the past 35 million years, as direct sampling of the sediments is limited to cores from only a few drill holes. The geometry and character of the seismic stratigraphy are used to infer glacial processes and the age of these events. In order to have a consistent circum-Antarctic interpretation of past glacial and tectonic events, a consistent seismic stratigraphy is needed.

To address this issue and develop an accessible electronic database of the marine stratigraphy, an International Polar Year project called ROSSMAP was developed for the Ross Sea, a complex region containing several major sedimentary basins. ROSSMAP is a project within the Scientific Committee on Antarctic Research (SCAR) Antarctic Climate Evolution (ACE) program. The first meeting of the ROSSMAP group was a workshop to study and resolve correlation issues in the marine seismic stratigraphy of the Ross Sea. It was held in mid-June at the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), in Trieste, Italy.

The workshop opened with a series of summary overviews by several research groups working in the region to ensure that all were aware of the range of research that had been undertaken and the issues encountered. The workshop then focused on two major issues: (1) sequences, sequence boundaries, and their seismic expression, and (2) correlation to drill sites and uncertainties in these correlations.

The three major basin systems in the Ross Sea were discussed in detail. The workshop considered that until seismic events can be correlated between basins unequivocally, a different sequence nomenclature should be used for each basin. Participants agreed that seismic sections should be set up for each major basin system on which the seismic stratigraphic units are defined, but a simple stratigraphy should be adopted until an adequate correlation is achieved between basins. The major reflectors for each basin were identified. Major problems exist in correlating between basin systems, and critical areas were identified. Correlation to drill sites and age control was then discussed. Issues included identifying the associated seismic events, their characteristics, and continuity; real uncertainty in ages; confidence in correlation to a drill site; priorities for new drill sites; and priorities for reprocessing seismic sections. Critical ages for future